In the claims:

1. An achromatic half wave plate, comprising:

a first twisted nematic liquid crystal layer;

a second twisted nematic liquid crystal layer; and

a uniaxial half wave plate between said first twisted nematic liquid crystal layer and said second twisted nematic liquid crystal layer.

2. The achromatic half wave plate of claim 1 wherein said first twisted nematic liquid crystal layer and said second twisted nematic liquid crystal layer have an identical twist angle.

3. The achromatic half wave plate of claim 2 wherein said twist angle is approximately 135 degrees.

4. The achromatic half wave plate of claim 1 wherein said first twisted nematic liquid crystal layer and said second twisted nematic liquid crystal layer include polymer liquid crystal films.

5. The achromatic half wave plate of claim 1 wherein said uniaxial half wave plate is constructed of a crystalline birefringent material.

6. The achromatic half wave plate of claim 1 wherein said uniaxial half wave plate is a nematic liquid crystal.

7. The achromatic half wave plate of claim 1 wherein said uniaxial half wave plate is a smectic A liquid crystal.

8. The achromatic half wave plate of claim 1 wherein said uniaxial half wave plate is a smectic C* liquid crystal.

9. The achromatic half wave plate of claim 1 further comprising a power source to apply a sufficiently high field to said first twisted nematic liquid crystal layer, said second twisted nematic liquid crystal layer, and said uniaxial half wave plate to produce liquid crystal layers that are simultaneously reoriented to a substantially homeotropic state.

10. The achromatic half wave plate of claim 1 wherein the remnant surface orientation of each liquid crystal surface is compensated by another liquid crystal surface with an orthogonal remnant surface orientation.

11. The achromatic half wave plate of claim 1 further comprising a power source to apply a sufficiently high field to said first twisted nematic liquid crystal layer, said second twisted nematic liquid crystal layer, and said uniaxial half wave plate to produce substantially no alteration of the polarization of an incident beam.

12. The achromatic half wave plate of claim 1 configured to provide approximately 30 db or more isolation between two polarization states over a wavelength range of +/- 20% of a central wavelength.

13. The achromatic half wave plate of claim 1 wherein said uniaxial half wave plate has an optic axis oriented at approximately 45 degrees to the polarization of an incident beam.

14. The achromatic half wave plate of claim 1 wherein said first twisted nematic liquid crystal layer and said second twisted nematic liquid crystal layer have an identical twist angle and different surface alignment orientations selected as a function of said twist angle.

15. The achromatic half wave plate of claim 1 configured to produce substantially uniform output polarization over at least a 50° C temperature range over a wavelength range of +/- 2% of a central wavelength.

16. The achromatic half wave plate of claim 1 wherein the optic axis at the entrance of said first twisted nematic liquid crystal layer is substantially orthogonal to the optic axis at the exit of said second twisted nematic liquid crystal layer.

17. The achromatic half wave plate of claim 1 wherein the optic axis at the entrance of said first twisted nematic liquid crystal layer is parallel to the polarization of an incident beam.

18. The achromatic half wave plate of claim 17 wherein the optic axis at the entrance of said uniaxial half wave plate makes an angle of 45 degrees to the polarization of said incident

beam, wherein said incident beam is linearly polarized, and an angle of 90 degrees to the optic axis at the exit of said first twisted nematic liquid crystal layer.

19. The achromatic half wave plate of claim 18 wherein the optic axis at the entrance of said second twisted nematic liquid crystal layer is parallel to the optic axis at the exit of said first twisted nematic liquid crystal layer and makes an angle of 90 degrees to the optic axis of said uniaxial half wave plate.

20. A method for achromatic electro-optical modulation, comprising:

applying a linearly polarized incident beam to an input surface of a first twisted nematic liquid crystal layer; and

processing said linearly polarized incident beam through a uniaxial half wave plate and a second twisted nematic liquid crystal layer to produce a substantially orthogonally polarized beam at an output surface of said second twisted nematic liquid crystal layer.

21. The method of claim 20 further comprising:

establishing greater than 30 db isolation between said linearly polarized incident beam and said substantially orthogonally polarized beam over a wavelength range of +/- 20% from the central wavelength of said incident beam.

22. The method of claim 20 further comprising:

producing substantially uniform output polarization over at least a 50° C temperature range over a wavelength range of +/- 2% from the central wavelength of said incident beam.

23. The method of claim 20 further comprising:

applying a sufficiently high field to said first twisted nematic liquid crystal layer, said second twisted nematic liquid crystal layer, and said uniaxial half wave plate to produce liquid crystal layers that are simultaneously reoriented to a substantially homeotropic state.

24. The method of claim 20 further comprising:

applying a sufficiently high field to said first twisted nematic liquid crystal layer, said second twisted nematic liquid crystal layer, and said uniaxial half wave plate to produce substantially no polarization change upon said linearly polarized incident beam.